The Planning Phase involves two primary issues: understanding why an information system should be developed and creating a plan for how the project team should develop it.

The deliverables from both steps are combined into the project plan. The project sponsor and approval committee then decide if the project should continue on.
CHAPTER 1

THE SYSTEMS ANALYST AND INFORMATION SYSTEMS DEVELOPMENT

This chapter introduces the role of the systems analyst in information systems development projects. First, the fundamental four-stage systems development life cycle (planning, analysis, design, and implementation) is established as the basic framework for the information system (IS) development process. Next, ways in which organizations identify and initiate potential projects are discussed. The first steps in the process are to identify a project that will deliver value to the business and to create a system request that provides the basic information about the proposed system. Next, the analysts perform a feasibility analysis to determine the technical, economic, and organizational feasibility of the system.

OBJECTIVES

- Explain the role played in information systems development by the systems analyst.
- Describe the fundamental systems development life cycle and its four phases.
- Explain how organizations identify IS development projects.
- Explain the importance of linking the information system to business needs.
- Be able to create a system request.
- Describe technical, economic, and organizational feasibility assessment.
- Be able to perform a feasibility analysis.
INTRODUCTION

The systems development life cycle (SDLC) is the process of determining how an information system (IS) can support business needs, designing the system, building it, and delivering it to users.

If you have taken a programming class or have programmed on your own, you have probably experienced some success in developing small software applications. Creating high-quality information systems that meet expectations and provide meaningful value to organizations is a much more complex endeavor, however.

Numerous studies over the years report that projects involving information technology experience failure rates from 30 to 70%. The definition of failure in these studies is often quite different, so the meaning of these statistics is hard to pin down. It is clear, though, that bringing an information system development project to a successful conclusion is difficult and many things need to be done right if we hope to achieve a positive outcome.

Although we would like to promote this book as a “silver bullet” that will keep you from experiencing failed IS projects, we must admit that such a silver bullet guaranteeing IS development success does not exist. Instead, this book will provide you with many fundamental concepts and practical techniques that you can use to improve the likelihood of success.

The systems analyst plays a key role in the SDLC, analyzing the business situation, identifying opportunities for improvements, and designing an information system to implement the improvements. Many systems analysts view their profession as one of the most interesting, exciting, and challenging jobs around. As a systems analyst, you will work as a team with a variety of people, including business and technical experts. You will feel the satisfaction of seeing systems that you designed and developed make a significant positive business impact, while knowing that your unique skills helped make that happen.

It is important to remember that the primary objective of the systems analyst is not to create a wonderful system. The primary goal is to create value for the organization, which for most companies means increasing profits. (Government agencies and not-for-profit organizations measure value differently.) Many failed projects were abandoned because the analysts tried to build a wonderful system without clearly understanding how the system would support the organization’s goals, improve business processes, and integrate with other information systems to provide value. An investment in an information system is like any other investment, such as a new machine tool. The goal is not to acquire the tool, because the tool is simply a means to an end; the goal is to enable the organization to perform work better so that it can earn greater profits or serve its constituents more effectively.

This book introduces you to the fundamental skills needed by a systems analyst. This is a pragmatic book that discusses best practices in systems development; it does not present a general survey of systems development that exposes you to everything about the topic. By definition, systems analysts do things and challenge the current way that an organization works. To get the most out of this book, you will need to actively apply the ideas and concepts in the examples and in the “Your Turn” exercises that are presented throughout to your own systems development project. This book will guide you through all the steps for delivering a successful information system. In the text, we illustrate how one organization, called Tune Source, applies the steps in one project, developing a Web-based digital music sales system. (Other illustrations of successful IS projects are provided on the course web site.) By the time

THE SYSTEMS ANALYST

The systems analyst plays a key role in information systems development projects. The systems analyst works closely with all project team members so that the team develops the right system in an effective way. Systems analysts must understand how to apply technology to solve business problems. In addition, systems analysts may serve as change agents who identify the organizational improvements needed, design systems to implement those changes, and train and motivate others to use the systems.

Systems Analyst Skills

New information systems introduce change to the organization and its people. Leading a successful organizational change effort is one of the most difficult jobs that someone can do. Understanding what to change, knowing how to change it, and convincing others of the need for change require a wide range of skills. These skills can be broken down into six major categories: technical, business, analytical, interpersonal, management, and ethical.
Analysts must have the technical skills to understand the organization’s existing technical environment, the new system’s technology foundation, and the way in which both can be fit into an integrated technical solution. Business skills are required to understand how IT can be applied to business situations and to ensure that IT delivers real business value. Analysts are continuous problem solvers at both the project and the organizational level, and they put their analytical skills to the test regularly.

Often, analysts need to communicate effectively, one-on-one with users and business managers (who often have little experience with technology) and with programmers (who often have more technical expertise than the analyst does). They must be able to give presentations to large and small groups and to write reports. Not only do they need to have strong interpersonal abilities, but they also need to manage people with whom they work, and they must manage the pressure and risks associated with unclear situations.

Finally, analysts must deal fairly, honestly, and ethically with other project team members, managers, and system users. Analysts often deal with confidential information or information that, if shared with others, could cause harm (e.g., dissent among employees); it is important for analysts to maintain confidence and trust with all people.

Systems Analyst Roles

As organizations and technology have become more complex, most large organizations now build project teams that incorporate several analysts with different, but complementary roles. In smaller organizations, one person may play several of these roles. Here we briefly describe these roles and how they contribute to a systems development project.

James is a systems analyst on a new account management system for Hometown National Bank. At a recent meeting with the project sponsor, James learned about some new ideas for the system that were not a part of the original project scope. Specifically, the bank’s marketing director has asked that some of the data that will be collected by the new system from customers who open new checking and savings accounts also be used as the basis of a marketing campaign for various loan products the bank offers.

James is uncomfortable with the request. He is not sure the bank has the right to use a person’s data for purposes other than the original intent. Who “owns” this data, the bank that collected it as a part of a customer opening an account, or the customer who the data describes? Should James insist that the customers give authorization to use “their” data in this way? Or should he say nothing and ignore the issue? Is it necessary (or appropriate) for a systems analyst to be an ethical watchdog in a systems development project? Why or why not?

1-1 Being an Analyst

Suppose you set a goal to become an analyst after you graduate. What type of analyst would you most prefer to be? Why does this particular analyst role appeal to you? What type of courses should you take before you graduate? What type of summer job or internship should you seek?

Question

Develop a short plan that describes how you will prepare for your career as an analyst.
The systems analyst role focuses on the IS issues surrounding the system. This person develops ideas and suggestions for ways that IT can support and improve business processes, helps design new business processes supported by IT, designs the new information system, and ensures that all IS standards are maintained. The systems analyst will have significant training and experience in analysis and design and in programming.

The business analyst role focuses on the business issues surrounding the system. This person helps to identify the business value that the system will create, develops ideas for improving the business processes, and helps design new business processes and policies. The business analyst will have business training and experience, plus knowledge of analysis and design.

The requirements analyst role focuses on eliciting the requirements from the stakeholders associated with the new system. As more organizations recognize the critical role that complete and accurate requirements play in the ultimate success of the system, this specialty has gradually evolved. Requirements analysts understand the business well, are excellent communicators, and are highly skilled in an array of requirements elicitation techniques (discussed in Chapter 3).

The infrastructure analyst role focuses on technical issues surrounding the ways the system will interact with the organization's technical infrastructure (hardware, software, networks, and databases). This person ensures that the new information system conforms to organizational standards and helps to identify infrastructure changes that will be needed to support the system. The infrastructure analyst will have significant training and experience in networking, database administration, and various hardware and software products. Over time, an experienced infrastructure analyst may assume the role of software architect, who takes a holistic view of the organization's entire IT environment and guides application design decisions within that context.

The change management analyst role focuses on the people and management issues surrounding the system installation. This person ensures that adequate documentation and support are available to users, provides user training on the new system, and develops strategies to overcome resistance to change. The change management analyst will have significant training and experience in organizational behavior and specific expertise in change management.

The project manager role ensures that the project is completed on time and within budget and that the system delivers the expected value to the organization. The project manager is often a seasoned systems analyst who, through training and experience, has acquired specialized project management knowledge and skills. More will be said about the project manager in the next chapter.

The roles and the names used to describe them may vary from organization to organization. In addition, there is no single typical career path through these professional roles. Some people may enter the field as a more technically oriented programmer/analyst. Others may enter as a business-oriented functional specialist with an interest in applying IT to solve business problems. As shown in Figure 1-1, those who are interested in the broad field of information systems development may follow a variety of paths during their career.

**THE SYSTEMS DEVELOPMENT LIFE CYCLE**

In many ways, building an information system is similar to building a house. First, the owner describes the vision for the house to the developer. Second, this idea is transformed into sketches and drawings that are shown to the owner and refined (often, through several drawings, each improving on the other) until the owner agrees that the pictures depict what he or she wants. Third, a set of detailed blueprints is developed that presents much more specific information about the house (e.g., the layout of rooms, placement of plumbing fixtures and
Building an information system using the SDLC follows a similar set of four fundamental phases: planning, analysis, design, and implementation (Figure 1-2). Each phase is itself composed of a series of steps, which rely on techniques that produce deliverables (specific documents and files that explain various elements of the system). Figure 1-3 provides more detail on the steps, techniques, and deliverables that are included in each phase of the SDLC and outlines how these topics are covered in this textbook.

Figures 1-2 and 1-3 suggest that the SDLC phases proceed in a logical path from start to finish. In some projects, this is true. In many projects, however, the project team moves through the steps consecutively, incrementally, iteratively, or in other patterns. Different projects may emphasize different parts of the SDLC or approach the SDLC phases in different ways, but all projects have elements of these four phases.

For now, there are two important points to understand about the SDLC. First, you should get a general sense of the phases and steps that IS projects move through and some of the techniques that produce certain deliverables. In this section, we provide an overview...
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<td>Post-implementation audit report</td>
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**FIGURE 1-3** Systems Development Life Cycle Phases
of the phases, steps, and some of the techniques that are used to accomplish the steps. Second, it is important to understand that the SDLC is a process of gradual refinement. The deliverables produced in the analysis phase provide a general idea what the new system will do. These deliverables are used as input to the design phase, which then refines them to produce a set of deliverables that describes in much more detailed terms exactly how the system should be built. These deliverables in turn are used in the implementation phase to guide the creation of the actual system. Each phase refines and elaborates on the work done previously.

**Planning**

The planning phase is the fundamental process of understanding why an information system should be built and determining how the project team will go about building it. It has two steps:

1. During project initiation, the system’s business value to the organization is identified—how will it contribute to the organization’s future success? Most ideas for new systems come from outside the IS area and are recorded on a system request. A system request presents a brief summary of a business need and explains how a system that addresses the need will create business value. The IS department works together with the person or department generating the request (called the project sponsor) to conduct a feasibility analysis. The feasibility analysis examines key aspects of the proposed project:
   - The technical feasibility (Can we build it?)
   - The economic feasibility (Will it provide business value?)
   - The organizational feasibility (If we build it, will it be used?)

   The system request and feasibility analysis are presented to an information systems approval committee (sometimes called a steering committee), which decides whether the project should be undertaken.

2. Once the project is approved, it enters project management. During project management, the project manager creates a workplan, staffs the project, and puts techniques in place to help control and direct the project through the entire SDLC. The deliverable for project management is a project plan that describes how the project team will go about developing the system.

**Analysis**

The analysis phase answers the questions of who will use the system, what the system will do, and where and when it will be used (Figure 1-3). During this phase, the project team investigates any current system(s), identifies improvement opportunities, and develops a concept for the new system. This phase has three steps:

1. An analysis strategy is developed to guide the project team’s efforts. Such a strategy usually includes studying the current system (called the as-is system) and its problems, and envisioning ways to design a new system (called the to-be system).

2. The next step is requirements gathering (e.g., through techniques such as interviews, group workshops, or questionnaires). The analysis of this information—in conjunction with input from the project sponsor and many other people—leads to the development of a concept for a new system. The system concept is explained through a set of requirement statements and a set of business analysis models that describe how the business will operate if the new system is developed. The analysis models represent user/system interactions and the data and processes needed to support the underlying business process.
3. The analyses, system concept, requirements, and models are combined into a document called the system proposal, which is presented to the project sponsor and other key decision makers (e.g., members of the approval committee) who will decide whether the project should continue to move forward.

The system proposal is the initial deliverable describing the requirements the new system should satisfy. Some experts suggest this phase would be better named analysis and initial design, rather than analysis, since it really provides the first step in the new system design. Since most organizations continue to use the name analysis for this phase, we will use it in this book as well. It is important to remember, however, that the deliverable from the analysis phase is both an analysis and a high-level initial design for the new system.

Design
The design phase decides how the system will operate in terms of the hardware, software, and network infrastructure that will be in place; the user interface, forms, and reports that will be used; and the specific programs, databases, and files that will be needed. Although most of the strategic decisions about the system are made in the development of the system concept during the analysis phase, the steps in the design phase determine exactly how the system will operate. The design phase has four steps:

1. The design strategy must be determined. This clarifies whether the system will be developed by the company’s own programmers, whether its development will be outsourced to another firm (usually a consulting firm), or whether the company will buy and install a prewritten software package.

2. This leads to the development of the basic architecture design for the system that describes the hardware, software, and network infrastructure that will be used. In most cases, the system will add to or change the infrastructure that already exists in the organization. The interface design specifies how the users will move through the system (e.g., by navigation methods such as menus and on-screen buttons) and the forms and reports that the system will use.

3. The database and file specifications are developed. These define exactly what data will be stored and where they will be stored.

4. The analyst team develops the program design, which defines the programs that need to be written and exactly what each program will do.

This collection of deliverables (architecture design, interface design, database and file specifications, and program design) is the system specification that is used by the programming team for implementation. At the end of the design phase, the feasibility analysis and project plan are reexamined and revised, and another decision is made by the project sponsor and approval committee about whether to terminate the project or continue (Figure 1-3).

Implementation
The final phase in the SDLC is the implementation phase, during which the system is actually built (or purchased and installed if the design calls for a prewritten software package). This is the phase that usually gets the most attention, because for most systems it is the longest and most expensive single part of the development process. This phase has three steps:

1. System construction is the first step. The system is built and tested to ensure that it performs as designed. Since the cost of fixing bugs can be immense, testing is one of the most critical steps in implementation. Most organizations should spend more time and attention on testing than on writing the programs in the first place.
2. The system is installed. *Installation* is the process by which the old system is turned off and the new one is turned on. There are several approaches that may be used to convert from the old to the new system. One of the most important aspects of conversion is *training*, during which users are taught to use the new system and help manage the resulting organizational changes.

3. The analyst team establishes a support plan for the system. This plan usually includes a formal or informal post-implementation review, as well as a systematic way for identifying major and minor changes needed for the system.

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**PROJECT IDENTIFICATION AND INITIATION**

Where do project ideas come from? A project is identified when someone in the organization identifies a *business need* to build a system. Examples of business needs include supporting a new marketing campaign, reaching out to a new type of customer, or improving interactions with suppliers. Sometimes, needs arise from some kind of “pain” within the organization, such as a drop in market share, poor customer service levels, unacceptable product defect rates, or increased competition. New business initiatives and strategies may be created and a system to support them is required, or a merger or acquisition may require systems to be integrated.

Business needs also can surface when the organization identifies unique and competitive ways of using IT. Many organizations keep an eye on *emerging technology*, which is technology that is in the early stages of widespread business use. For example, if companies stay abreast of technological advances such as cloud computing, mobile apps, or Big Data, they can develop business strategies that leverage the capabilities of these technologies and introduce them into the marketplace as a *first mover*. Ideally, companies can take advantage of this first mover position by making money and continuing to innovate while competitors trail behind.

Today, many new information system projects grow out of *business process management (BPM)* initiatives. BPM is a methodology used by organizations to continuously improve end-to-end business processes. BPM can be applied to internal organizational processes and to processes spanning multiple business partners. By studying and improving their underlying business processes, organizations can achieve several important benefits, including:

- enhanced process agility, giving the organization the ability to adapt more rapidly and effectively to a changing business environment;
- improved process alignment with industry “best practices”; and
- increased process efficiencies as costs are identified and eliminated from process workflows.

BPM generally follows a continuous cycle of systematically creating, assessing, and altering business processes. Business analysts, with their in-depth business knowledge, play a particularly important role in BPM by:

1. defining and mapping the steps in a business process,
2. creating ways to improve on steps in the process that add value,
3. finding ways to eliminate or consolidate steps in the process that do not add value,
4. creating or adjusting electronic workflows to match the improved process maps.

The last step is particularly relevant to our discussion since the need for information systems projects is frequently identified here. In fact, the automation of business processes (termed *business process automation*), is the foundation of many information technology systems. In these situations, technology components are used to complement or substitute for manual information management processes with the intent of gaining cost efficiencies.
BPM practitioners recognize, however, that it is not always advisable to just “pave the cow paths” by simply adding automation to speed up existing processes (step 4 above). In many situations, business process improvement (BPI) results from studying the business processes, creating new, redesigned processes to improve the process workflows, and/or utilizing new technologies enabling new process structures (steps 2, 3, and 4 above). For example, could a retail store’s checkout process be redesigned along the lines of the EZPass toll collection system on highways? Could customers check out and pay with their mobile devices while clerks simply review the contents of the customer’s shopping bag?

Projects with a goal of BPI make moderate changes to the organization’s operations, and can improve efficiency (i.e., doing things right) and improve effectiveness (i.e., doing the right things). These types of projects involve more risk than business process automation projects since more significant changes are made to the organization’s operations.

BPM may also reveal the need for the complete revamping of the organization’s business processes, termed business process reengineering (BPR). BPR means changing the fundamental way in which the organization operates—“obliterating” the current way of doing business and making major changes to take advantage of new ideas and new technology. As you might expect, BPR projects involve substantial risk due to the significant organizational and operational changes that result. Top management support and careful management are critical in these fairly rare types of projects.

Both IT people (i.e., the information systems experts) and business people (i.e., the subject matter experts) should work closely together to find ways for technology to support business needs. In this way, organizations can leverage the exciting technologies available while ensuring that projects are based upon real business objectives such as increasing sales, improving customer service, and decreasing operating expenses. Ultimately, information systems need to affect the organization’s bottom line (in a positive way!).

When a strong business need for an information system is recognized, often as a result of BPM, a person (or group) who has an interest in the system’s success typically steps forward. We call this person (or group) the project sponsor. Often, the project sponsor develops the initial vision of the new system. The project sponsor works throughout the SDLC to make sure that the project is moving in the right direction from the perspective of the business and serves as the primary point of contact for the project team. Usually, the sponsor of the project is from a business function such as marketing, accounting, or finance; however, members of the IT area also can sponsor or cosponsor a project.

**CONCEPTS**

**1-B BPI on the Farm**

In the farming industry, grain is commonly loaded into large grain-hauling trucks by the driver parking under the grain bin, jumping out of the truck cab, signaling the grain bin operator to start filling, monitoring the fill level, signaling the bin operator to stop filling, jumping back into the truck cab, driving 3 feet forward, and repeating the cycle numerous times until the truck bed is full. This laborious process can be simplified by digitizing the process. Cameras and secure Wi-Fi can be installed on the grain bin. When a truck arrives, the driver can open an app on his smartphone from the truck cab. Through the app, the driver can initiate, monitor, and control the filling process without a grain bin operator and without leaving the truck. This real-world example illustrates BPI, the redesign of a business process with the right application of information technology, providing significant efficiency gains.

Adapted from: Nicole Laskowski, “Crowdsourcing is the new cloud computing—Get with it, CIOs,” searchcio.techtarget.com, accessed February 2014.
The size or scope of the project often determines the kind of sponsor who is involved. A small, departmental system might be sponsored by a single manager; however, a large, organizational initiative might be sponsored by the entire senior management team and even the CEO. If a project is primarily technical in nature (e.g., improvements to the existing IT infrastructure or research into the viability of an emerging technology), then sponsorship from IT is appropriate. When projects have great importance to the business, yet are technically complex, joint sponsorship by both the business and IT functions may be necessary.

The business need drives the high-level business requirements for the system. Business requirements describe the reasons for developing the system and outline the capabilities it will provide the organization. These requirements need to be explained at a high level so that the approval committee and, ultimately, the project team understand what the business expects from the final product. Business requirements summarize the features the information system must include, such as the ability to collect customer orders online or the ability for suppliers to receive inventory status information as sales occur.

The project sponsor has the insights needed to determine the business value that will be gained from the system, in both tangible and intangible ways. Tangible value can be quantified and measured easily (e.g., 2% reduction in operating costs). An intangible value results from an intuitive belief that the system provides important, but hard-to-measure, benefits to the organization (e.g., improved customer service, a better competitive position).

Once the project sponsor identifies a project that meets an important business need and he or she can identify the business requirements and business value of the system, it is time to formally initiate the project. In most organizations, project initiation begins by preparing a system request.

**System Request**

A system request is a document that describes the business reasons for building a system and the value that the system is expected to provide. The project sponsor usually completes this
form as part of a formal system project selection process within the organization. Most system requests include five elements: project sponsor, business need, business requirements, business value, and special issues (Figure 1-4). The sponsor describes the person who will serve as the primary contact for the project, and the business need presents the reasons prompting the project. The business requirements of the project refer to the business capabilities that the system must have, and the business value describes the benefits that the organization should expect from the system. Special issues are included on the document as a catchall category for other information that should be considered in assessing the project. For example, the project may need to be completed by a specific deadline. Any special circumstances that could affect the outcome of the project must be clearly identified.

The completed system request is submitted to the approval committee for consideration. This approval committee could be a company steering committee that meets regularly to make information systems decisions, a senior executive who has control of organizational resources, or any other decision-making body that governs the use of business resources. The committee reviews the system request and makes an initial determination, based on the information provided, of whether to investigate the proposed project or not. If approved, the next step is to conduct a feasibility analysis.

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Sponsor</td>
<td>The person who initiates the project and who serves as the primary point of contact for the project on the business side</td>
<td>Several members of the finance department</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vice president of marketing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CIO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CEO</td>
</tr>
<tr>
<td>Business Need</td>
<td>The business-related reason for initiating the system</td>
<td>Reach a new market segment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Offer a capability to keep up with competitors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improve access to information</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Decrease product defects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Streamline supply acquisition processes</td>
</tr>
<tr>
<td>Business Requirements</td>
<td>The new or enhanced business capabilities that the system will provide</td>
<td>Provide online access to information</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capture customer demographic information</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Include product search capabilities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Produce performance reports</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enhance online user support</td>
</tr>
<tr>
<td>Business Value</td>
<td>The benefits that the system will create for the organization</td>
<td>3% increase in sales</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1% increase in market share</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduction in headcount by 5 FTEs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$200,000 cost savings from decreased supply costs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$150,000 savings from removal of outdated technology</td>
</tr>
<tr>
<td>Special Issues or Constraints</td>
<td>Issues that pertain to the approval committee’s decision</td>
<td>Government-mandated deadline for May 30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>System needed in time for the Christmas holiday season</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Top-level security clearance needed by project team to work with data</td>
</tr>
</tbody>
</table>

FTE, full-time equivalent.
1-C Interview with Don Hallacy, President, Technology Services, Sprint Corporation

At Sprint, network projects originate from two vantage points—IT and the business units. IT projects usually address infrastructure and support needs. The business-unit projects typically begin after a business need is identified locally, and a business group informally collaborates with IT regarding how a solution can be delivered to meet customer expectations.

Once an idea is developed, a more formal request process begins, and an analysis team is assigned to investigate and validate the opportunity. This team includes members from the user community and IT, and they scope out at a high level what the project will do; create estimates for technology, training, and development costs; and create a business case. This business case contains the economic value added and the net present value of the project.

Of course, not all projects undergo this rigorous process. The larger projects require more time to be allocated to the analysis team. It is important to remain flexible and not let the process consume the organization. At the beginning of each budgetary year, specific capital expenditures are allocated for operational improvements and maintenance. Moreover, this money is set aside to fund quick projects that deliver immediate value without going through the traditional approval process. Don Hallacy

Applying the Concepts at Tune Source

Throughout the book, we will apply the concepts in each chapter to a fictitious company called Tune Source. For example, in this section, we will illustrate the creation of a system request. Tune Source is a company headquartered in southern California. Tune Source is the brainchild of three entrepreneurs with ties to the music industry: John Margolis, Megan Taylor, and Phil Cooper. Originally, John and Phil partnered to open a number of brick and mortar stores in southern California specializing in hard-to-find and classic jazz, rock, country, and folk recordings. Megan soon was invited to join the partnership because of her contacts and knowledge of classical music. Tune Source quickly became known as the place to go to find rare audio recordings. Annual sales last year were $40 million with annual growth at about 3–5% per year.

1-3 Too Much Paper, Part 1

The South Dakota Department of Labor, Workers’ Compensation division was sinking under a load of paper files. This state agency ascertains that employees are treated fairly when they are injured on the job. If a person (or company) called to see the status of an injury claim, the clerk would have to take a message, get the paper file, review the status, and call the person back. Files were stored in huge filing cabinets and were entered by year and case number (i.e., the 415th person injured in 2008 would be in a file numbered 08-415). Few callers knew the file number and would give their name and address and the date of injury. The clerk would look in a spiral notebook for the last name around the date that was given—and then find the file number to retrieve the folder. Some folders were small—possibly documenting a minor injury requiring only a brief treatment period.

Other folders could be very large, with numerous medical reports from several doctors verifying the extent of a serious injury and treatment (such as an arm amputation). A digital solution was suggested—reports could be submitted online via a secure web site. Medical reports could be submitted electronically, either as a pdf file or as a faxed digital file. This solution would also mean that the clerk taking the phone call could query the database by the person’s name and access the information in a matter of seconds.

Question

Begin a systems request for this project. Focus on stating the business need and the business requirements for this project. What is the value of this system?
Background  John, Megan, and Phil, like many others in the music industry, watched with alarm the rise of music-sharing web site like Napster, as music consumers shared digital audio files without paying for them, denying artists and record labels royalties associated with sales. Once the legal battle over copyright infringement was resolved and Napster was shut down, the partners set about establishing agreements with a variety of industry partners in order to offer a legitimate digital music download resource for customers in their market niche. Phil has asked Carly Edwards, a rising star in the Tune Source marketing department, to spearhead the digital music download project.

Tune Source currently has a web site that enables customers to search for and purchase CDs. This site was initially developed by an Internet consulting firm and is hosted by a prominent local internet service provider (ISP) in Los Angeles. The IT department at Tune Source has become experienced with Internet technology as it has worked with the ISP to maintain the site.

System Request  At Tune Source, new IT projects are reviewed and approved by a project steering committee that meets quarterly. The committee has representatives from IT as well as from the major areas of the business. Carly’s first step was to prepare a system request for the committee.

Figure 1-5 shows the system request she prepared. The project sponsor is Carly, and the business needs are to increase sales and provide a music download capability demanded by a

### System Request—Digital Music Download Project

**Project Sponsor:** Carly Edwards, Assistant Vice President, Marketing

**Business Need:** This project has been initiated to create the capability of selling digital music downloads to customers through kiosks in our stores and over the Internet using our web site. Currently,

- Customers have many alternatives for downloading music and we need to provide this capability to retain our competitive position.
- Our music archive of rare and hard-to-find music is underutilized.

**Business Requirements:** Using this system over the Web or in-store kiosks, customers will be able to search for and purchase digital music downloads. The specific functionality that the system should have includes the following:

- Search for music in our digital music archive.
- Listen to music samples.
- Purchase individual downloads at a fixed fee per download.
- Establish a customer subscription account permitting unlimited downloads for a monthly fee.
- Purchase music download gift cards.

**Business Value:** We expect that Tune Source will increase sales by enabling existing customers to purchase specific digital music tracks and by reaching new customers who are interested in our unique archive of rare and hard-to-find music. We expect to gain a new revenue stream from customer subscriptions to our download services. We expect some increase in cross-selling, as customers who have downloaded a track or two of a CD decide to purchase the entire CD in a store or through our web site. We also expect a new revenue stream from the sale of music download gift cards.

Conservative estimates of tangible value to the company include the following:

- $757,500 in sales from individual music downloads
- $950,000 in sales from customer subscriptions
- $205,000 in additional in-store or web site CD sales
- $153,000 in sales from music download gift cards

**Special Issues or Constraints:**

- The marketing department views this as a strategic system. To prevent significant customer attrition, this project should be completed as soon as possible.
very competitive marketplace. Notice that the need does not focus on the technology associated with the project. The emphasis is on the business aspects: increasing sales and maintaining a competitive position in the company’s market.

In the system request, the project sponsor focuses on describing his or her vision of the business requirements at a very high level. Carly has expressed a clear vision of how this system will affect Tune Source: sales of individual music downloads, revenue from customer subscriptions, sales from cross-selling of CDs, and sales of music download gift cards. Carly acknowledges customer demand for this capability and also recognizes the need to respond to this demand in order to retain the business of its loyal customer base.

The estimates of tangible value were difficult to develop, since this venture is completely new to Tune Source. To prepare for this, Carly had several of her staff members conduct both an in-store customer survey and an online customer survey to assess the customers’ interest in individual music downloads, subscription programs, and gift cards. The surveys also attempted to gauge the customers’ price sensitivity for these offerings.

From the survey results, Carly and her staff developed a range of sales projections for the various revenue streams: a high-level estimate, a medium-level estimate, and low-level estimate. They also developed probability assessments for each of these outcomes, settling on a 25% likelihood for the high-level estimate, a 60% likelihood for the medium-level estimate, and a 15% likelihood for the low-level estimate. Based on the sales projections and the probability estimates, a weighted average estimated sales figure was computed for each revenue stream.

For example, for individual downloads,

\[
\text{Expected sales} = (900,000 \times 0.25) + (750,000 \times 0.60) + (550,000 \times 0.15)
\]

\[
= 225,000 + 450,000 + 82,500
\]

\[
= 757,500
\]

These projections are summarized in Figure 1-6.

After analyzing the survey results, Carly and her staff were confident that the sales projections and probability estimates were as accurate as they could make them this early in the project. The completed system request is shown in Figure 1-5.

**Steering Committee Approval** Carly Edwards presented the system request for the digital music download project to the Tune Source project steering committee at its next meeting. Response to the request was uniformly positive. The strong support for the project by John, Megan, and Phil, the company’s top executives, helped to spur the committee’s rapid approval of the project. Following approval of the system request, Jason Wells, a senior systems analyst in the IT department, was assigned to work with Carly to develop a preliminary feasibility analysis for the project.

**FIGURE 1-6**
Sales Projections for Tune Source Digital Music Download Project

<table>
<thead>
<tr>
<th>Sales Projections</th>
<th>Individual Downloads</th>
<th>Subscriptions</th>
<th>Cross-Selling of CDs</th>
<th>Gift Cards</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-level estimate (prob. = 25%)</td>
<td>$900,000</td>
<td>$1,100,000</td>
<td>$250,000</td>
<td>$180,000</td>
</tr>
<tr>
<td>Medium-level estimate (prob. = 60%)</td>
<td>750,000</td>
<td>950,000</td>
<td>200,000</td>
<td>150,000</td>
</tr>
<tr>
<td>Low-level estimate (prob. = 15%)</td>
<td>550,000</td>
<td>700,000</td>
<td>150,000</td>
<td>120,000</td>
</tr>
<tr>
<td>Weighted average expected sales</td>
<td>$757,500</td>
<td>$950,000</td>
<td>$205,000</td>
<td>$153,000</td>
</tr>
</tbody>
</table>
Once the need for the system and its business requirements have been defined, the approval committee authorizes the systems analyst to prepare a more detailed business case to better understand the proposed information system project. Feasibility analysis guides the organization in determining whether to proceed with the project. Feasibility analysis also identifies the important risks associated with the project that must be managed if the project is approved. As with the system request, each organization has its own process and format for the feasibility analysis, but most include techniques to assess three areas: technical feasibility, economic feasibility, and organizational feasibility (Figure 1-7). The results of evaluating these three feasibility factors are combined into a feasibility study deliverable that is submitted to the approval committee.

You might wonder at the omission of the element of time as a risk factor for the project. While the time available for a project can certainly be a concern, we consider time to be a project management issue. We will discuss project management strategies that can be used when time is tight in Chapter 2.

Although we will discuss feasibility analysis now within the context of project initiation, most project teams revise the feasibility study throughout the SDLC and revisit its contents at various checkpoints during the project. If at any point the project’s risks and limitations outweigh its benefits, the project team may decide to cancel the project or make substantial revisions.

**Technical Feasibility**

The first issue in the feasibility analysis is to assess the technical feasibility of the project, the extent to which the system can be successfully designed, developed, and installed by the IT group. Technical feasibility analysis is, in essence, a technical risk analysis that strives to answer the question: “Can we build it?”

---

**FIGURE 1-7**

Feasibility Analysis Assessment Factors

A template for this figure is available on the student web site

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3 We use the words “build it” in the broadest sense. Organizations can also choose to buy a commercial software package and install it, in which case the question might be “Can we select the right package and successfully install it?”
Many risks can endanger the successful completion of the project. First and foremost is the users’ and analysts’ familiarity with the application. When analysts are unfamiliar with the business application area, they have a greater chance of misunderstanding the users or missing opportunities for improvement. The risks increase dramatically when the users themselves have limited knowledge of the application. If the project involves a new business innovation, neither the users nor the analysts may have any direct knowledge or experience of the proposed new application. In general, the development of new systems is riskier than extensions to an existing system, because existing systems tend to be better understood.

Familiarity with the technology is another important source of technical risk. When a system uses technology that has not been used before within the organization, there is a greater chance that problems and delays will occur because of the need to learn how to use the technology. Risk increases dramatically when the technology itself is new (e.g., a Big Data project using Hadoop). When the technology is not new but the organization lacks experience with it, technical risk is reduced somewhat, since outside expertise should be available from vendors and consultants.

Project size is an important consideration, whether measured as the number of people on the development team, the length of time it will take to complete the project, or the number of distinct features in the system. Larger projects present more risk, because they are more complicated to manage and because there is a greater chance that some important system requirements will be overlooked or misunderstood. Large systems are typically highly integrated with other systems, increasing project complexity.

Finally, project teams need to consider the compatibility of the new system with the technology that already exists in the organization. Systems are rarely built in a vacuum—they are built in organizations that have numerous systems already in place. New technology and applications need to be able to integrate with the existing environment for many reasons. They may rely on data from existing systems, they may produce data that feed other applications, and they may have to use the company’s existing communications infrastructure. A new CRM system, for example, has little value if it does not use customer data found across the organization in existing sales systems, marketing applications, and customer service systems.

The assessment of a project’s technical feasibility is not cut and dried, because in many cases, some interpretation of the underlying conditions is needed (e.g., how large does a project need to grow before it is considered “big”?). One approach is to compare the project with prior projects undertaken by the organization. Another option is to consult with experienced IT professionals in the organization or with external IT consultants; often, they will be able to judge whether a project is feasible from a technical perspective.

Economic Feasibility

The second element of a feasibility analysis is to perform an economic feasibility analysis (also called a cost–benefit analysis). This attempts to answer the question “Should we build the system?” Economic feasibility is determined by identifying costs and benefits associated with the system, assigning values to them, calculating future cash flows, and measuring the financial worthiness of the project. As a result of this analysis, the financial opportunities and risks of the project can be understood. Keep in mind that organizations have limited capital resources and multiple projects will be competing for funding. The more expensive the project, the more rigorous and detailed the analysis should be. Before illustrating this process with a detailed example, we first introduce the framework we will apply to evaluate project investments and the common assessment measures that are used.

Cash Flow Analysis and Measures IT projects commonly involve an initial investment that produces a stream of benefits over time, along with some ongoing support costs. Therefore, the
value of the project must be measured over time. Cash flows, both inflows and outflows, are estimated over some future period. Then, these cash flows are evaluated using several techniques to judge whether the projected benefits justify incurring the costs.

A very basic cash flow projection is shown in Figure 1-8 to demonstrate these evaluation techniques. In this simple example, a system is developed in Year 0 (the current year) costing $100,000. Once the system is operational, benefits and on-going costs are projected over 3 years. In row 3 of this figure, net benefits are computed by subtracting each year’s total costs from its total benefits. Finally, in row 4, we have computed a cumulative total of the net cash flows.

Two of the common methods for evaluating a project’s worth can now be determined. Each of these calculations will be explained here:

**Return on Investment**  
The return on investment (ROI) is a calculation that measures the average rate of return earned on the money invested in the project. ROI is a simple calculation that divides the project’s net benefits (total benefits – total costs) by the total costs. The ROI formula is:

$$ROI = \frac{\text{Total Benefits} - \text{Total Costs}}{\text{Total Costs}}$$

$$ROI = \frac{152,000 - 138,000}{138,000} = \frac{14,000}{138,000} = 10.14\%$$

A high ROI suggests that the project’s benefits far outweigh the project’s cost, although exactly what constitutes a “high” ROI is unclear. ROI is commonly used in practice; however, it is hard to interpret and should not be used as the only measure of a project’s worth.

**Break-Even Point**  
Another common approach to measuring a project’s worth is the break-even point. The break-even point (also called the payback method) is defined as the number of years it takes a firm to recover its original investment in the project from net cash flows. As shown in row 4 of Figure 1-8, the project’s cumulative cash flow figure becomes positive during Year 3, so the initial investment is “paid back” over two years plus some fraction of the third year.

**(In the year in which Cumulative Cash Flow turns positive):**

$$\text{BEP} = \frac{\text{Number of years of negative cash flow}}{\text{That year’s Net Cash Flow}} + \frac{\text{That year’s Net Cash Flow} - \text{That year’s Cumulative Cash Flow}}{\text{That year’s Net Cash Flow}}$$

<table>
<thead>
<tr>
<th></th>
<th>Year 0</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Costs</td>
<td>100,000</td>
<td>10,000</td>
<td>12,000</td>
<td>16,000</td>
<td>138,000</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>(100,000)</td>
<td>35,000</td>
<td>38,000</td>
<td>41,000</td>
<td>14,000</td>
</tr>
<tr>
<td>Cumulative Net Cash Flow</td>
<td>(100,000)</td>
<td>(65,000)</td>
<td>(27,000)</td>
<td>14,000</td>
<td></td>
</tr>
</tbody>
</table>
Using the values in Figure 1-8, the BEP calculation is:

\[
\text{BEP} = 2 + \frac{41,000 - 14,000}{41,000} = 2 + \frac{27,000}{41,000} = 2.68 \text{ years}
\]

The break-even point is intuitively easy to understand and does give an indication of a project’s liquidity, or the speed at which the project generates cash returns. Also, projects that produce higher returns early in the project’s life are thought to be less risky, since we can anticipate near-term events with more accuracy than long-term events. The break-even point ignores cash flows that occur after the break-even point has been reached; therefore, it is biased against longer-term projects.

**Discounted Cash Flow Technique** The simple cash flow projection shown in Figure 1-8, and the return on investment and break-even point calculations all share the weakness of not recognizing the time value of money. In these analyses, the timing of cash flows is ignored. A dollar in Year 3 of the project is considered to be exactly equivalent to a dollar received in Year 1.

Discounted cash flows are used to compare the present value of all cash inflows and outflows for the project in today’s dollar terms. The key to understanding present values is to recognize that if you had a dollar today, you could invest it and receive some rate of return on your investment. Therefore, a dollar received in the future is worth less than a dollar received today, since you forgo that potential return. If you have a friend who owes you $100 today, but instead gives you that $100 in 3 years—you’ve been had! Assuming you could have invested those dollars at a 10% rate of return, you will be receiving the equivalent of $75 in today’s terms.

The basic formula to convert a future cash flow to its present value is:

\[
\text{PV} = \frac{\text{Cash flow amount}}{(1 + \text{Rate of return})^n}, \text{ where } n \text{ is the year in which the cash flow occurs.}
\]

The rate of return used in the present value calculation is sometimes called the required rate of return, or the cost of obtaining the capital needed to fund the project. Many organizations will have determined the appropriate rate of return to use when analyzing IT investments. The systems analyst should consult with the organization’s finance department.

Using our previous illustration, $100 received in 3 years with a required rate of return of 10% has a PV of $75.13.

\[
\text{PV} = \frac{100}{(1 + 0.1)^3} = \frac{100}{1.331} = 75.13
\]

In Figure 1-9, the present value of the projected benefits and costs shown in Figure 1-8 have been calculated using a 10% required rate of return.

<table>
<thead>
<tr>
<th>Year</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Benefits</td>
<td>45,000</td>
<td>50,000</td>
<td>57,000</td>
<td></td>
</tr>
<tr>
<td>PV of Total Benefits</td>
<td>40,909</td>
<td>41,322</td>
<td>42,825</td>
<td>125,056</td>
</tr>
<tr>
<td>Total Costs</td>
<td>100,000</td>
<td>10,000</td>
<td>12,000</td>
<td>16,000</td>
</tr>
<tr>
<td>PV of Total Costs</td>
<td>100,000</td>
<td>9,091</td>
<td>9,917</td>
<td>12,021</td>
</tr>
</tbody>
</table>
**Net Present Value (NPV)** The NPV is simply the difference between the total present value of the benefits and the total present value of the costs.

\[
\text{NPV} = \sum \text{PV of Total Benefits} - \sum \text{PV of Total Costs}
\]

\[
= $125,056 - $131,029 = ($5,973)
\]

As long as the NPV is greater than zero, the project is considered economically acceptable. Unfortunately for this project, the NPV is less than zero, indicating that for a required rate of return of 10%, this project should not be accepted. The required rate of return would have to be something less than 6.65% before this project returns a positive NPV. This example illustrates the fact that sometimes the “naïve” techniques of ROI and BEP find that the project appears acceptable, but the more rigorous and financially correct NPV technique finds the project is actually unacceptable.

Figure 1-10 reviews the steps involved in performing an economic feasibility analysis. Each step will be illustrated by an example in the upcoming sections.

**Identify Costs and Benefits** The systems analyst’s first task when developing an economic feasibility analysis is to identify the kinds of costs and benefits the system will have and list them along the left-hand column of a spreadsheet. Figure 1-11 lists examples of costs and benefits that may be included. The costs and benefits can be broken down into four categories: (1) development costs, (2) operational costs, (3) tangible benefits, and (4) intangibles. Development costs are those tangible expenses that are incurred during the creation of the system, such as salaries for the project team, hardware and software expenses, consultant fees, training, and office space and equipment. Development costs are usually thought of as one-time costs. Operational costs are those tangible costs that are required to operate the system, such as the salaries for operations staff, software licensing fees, equipment upgrades, and cloud vendor fees. Operational costs are usually thought of as ongoing costs. As you can see from the list of Operational Costs in Figure 1-11, it is important to include every relevant cost factor over the life of the system, so that we estimate the Total Cost of Ownership (TCO).

1. **Identify Costs and Benefits** List the tangible costs and benefits for the project. Include both one-time and recurring costs.

2. **Assign Values to Costs and Benefits** Work with business users and IT professionals to create numbers for each of the costs and benefits. Even intangibles should be valued if at all possible.

3. **Determine Cash Flow** Forecast what the costs and benefits will be over a certain period, usually, 3–5 years. Apply a growth rate to the values, if necessary.

4. **Assess Project’s Economic Value** Evaluate the project’s expected returns in comparison to its costs. Use one or more of the following evaluation techniques:
   - **Return on Investment (ROI)** Calculate the rate of return earned on the money invested in the project, using the ROI formula.
   - **Break-Even Point (BEP)** Find the year in which the cumulative project benefits exceed cumulative project costs. Apply the breakeven formula, using figures for that year. This calculation measures how long it will take for the system to produce benefits that cover its costs.
   - **Net Present Value (NPV)** Restate all costs and benefits in today’s dollar terms (present value), using an appropriate discount rate. Determine whether the total present value of benefits is greater than or less than the total present value of costs.
Tangible benefits include revenue that the system enables the organization to collect, such as increased sales. In addition, the system may enable the organization to avoid certain costs, leading to another type of tangible benefit: cost savings. For example, if the system produces a reduction in needed staff, lower salary costs result. Similarly, a reduction in required inventory levels due to the new system produces lower inventory costs. In these examples, the reduction in costs is a tangible benefit of the new system.

Of course, a project also can affect the organization’s bottom line by reaping intangible benefits or incurring intangible costs. Intangible costs and benefits are more difficult to incorporate into the economic feasibility analysis because they are based on intuition and belief rather than on “hard numbers.” Nonetheless, they should be listed in the spreadsheet along with the tangible items.

Assign Values to Costs and Benefits  Once the types of costs and benefits have been identified, the analyst needs to assign specific dollar values to them. This may seem impossible—How can someone quantify costs and benefits that have not happened yet? And how can those predictions be realistic? Although this task is very difficult, you have to do the best you can to come up with reasonable numbers for all of the costs and benefits. Only then can the approval committee make an informed decision about whether or not to move ahead with the project.

The most effective strategy for estimating costs and benefits is to rely on the people who have the best understanding of them. For example, costs and benefits that are related to the technology or the project itself can be provided by the company’s IT group or external consultants, and business users can develop the numbers associated with the business (e.g., sales projections, order levels). The company also can consider past projects, industry reports, and vendor information, although these sources probably will be a bit less accurate. Likely, all of the estimates will be revised as the project proceeds.

If predicting a specific value for a cost or benefit is proving difficult, it may be useful to estimate a range of values for the cost or benefit and then assign a likelihood (probability) estimate to each value. With this information, an expected value for the cost or benefit can be calculated. Recall the calculations shown in Figure 1-6 in which the Tune Source marketing staff developed expected
values for projected sales. As more information is learned during the project, the value estimates and the probability estimates can be revised, resulting in a revised expected value for the cost or benefit.

What about the intangible benefits and costs? Sometimes, it is acceptable to list intangible benefits, such as improved customer service, without assigning a dollar value. Other times, estimates have to be made regarding how much an intangible benefit is “worth.” We suggest that you quantify intangible costs or benefits if at all possible. If you do not, how will you know if they have been realized? Suppose that a system claims to improve customer service. This benefit is intangible, but let us assume that the improvement in customer service will decrease the number of customer complaints by 10% each year over 3 years and that $200,000 is currently spent on phone charges and phone operators who handle complaint calls. Suddenly, we have some very tangible numbers with which to set goals and measure the originally intangible benefit.

A detailed cost–benefit analysis is shown in Figure 1-12. In this example, benefits accrue because the project is expected to increase sales, reduce customer complaint calls, and lower reduced inventory costs.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased sales</td>
<td>500,000</td>
<td>530,000</td>
<td>561,800</td>
<td>595,508</td>
<td>2,187,308</td>
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</tr>
<tr>
<td>Reduction in customer complaint calls</td>
<td>70,000</td>
<td>70,000</td>
<td>70,000</td>
<td>70,000</td>
<td>280,000</td>
<td></td>
</tr>
<tr>
<td>Reduced inventory costs</td>
<td>68,000</td>
<td>68,000</td>
<td>68,000</td>
<td>68,000</td>
<td>272,000</td>
<td></td>
</tr>
<tr>
<td>Total Benefits</td>
<td>638,000</td>
<td>668,000</td>
<td>699,800</td>
<td>733,508</td>
<td>2,739,308</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Development Costs</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2 servers @ $125,000</td>
<td>250,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>250,000</td>
</tr>
<tr>
<td>Printer</td>
<td>100,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100,000</td>
</tr>
<tr>
<td>Software licenses</td>
<td>34,825</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>34,825</td>
</tr>
<tr>
<td>Server software</td>
<td>10,945</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10,945</td>
</tr>
<tr>
<td>Development labor</td>
<td>1,236,525</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1,236,525</td>
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<tr>
<td>Total Development Costs</td>
<td>1,632,295</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1,632,295</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operational Costs</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware</td>
<td>50,000</td>
<td>50,000</td>
<td>50,000</td>
<td>50,000</td>
<td>200,000</td>
<td></td>
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<tr>
<td>Software</td>
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<td>20,000</td>
<td>20,000</td>
<td>20,000</td>
<td>80,000</td>
<td></td>
</tr>
<tr>
<td>Operational labor</td>
<td>115,000</td>
<td>119,600</td>
<td>124,384</td>
<td>129,359</td>
<td>488,343</td>
<td></td>
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<td>Total Operational Costs</td>
<td>185,000</td>
<td>189,600</td>
<td>194,384</td>
<td>199,359</td>
<td>768,343</td>
<td></td>
</tr>
</tbody>
</table>

| Total Costs                       | 1,632,295| 185,000| 189,600 | 194,384 | 199,359 | 2,400,638|
| Total Benefits – Total Costs      | (1,632,295)| 453,000| 478,400 | 505,416 | 534,149 | 338,670 |
| Cumulative Net Cash Flow          | (1,632,295)| (1,179,295)| (700,895)| (195,479)| 338,670 |

| Return on Investment (ROI)        | 14.1%   | (338,670/2,400,638) |        |         |         |        |

| Break-Even Point                  | 3.37 years | (3 years of negative cumulative cash flow + [534,149 – 338,670]/534,149 = 0.37) |        |         |         |        |

---

*aCustomer service values are based on reduced costs of handling customer complaint phone calls.*

*bAn important yet intangible benefit will be the ability to offer services that our competitors currently offer.*
I conducted a case study at Carlson Hospitality, a global leader in hospitality services, encompassing more than 1300 hotel, resort, restaurant, and cruise ship operations in 79 countries. One of its brands, Radisson Hotels & Resorts, researched guest stay information and guest satisfaction surveys. The company was able to quantify how much of a guest’s lifetime value can be attributed to his or her perception of the stay experience. As a result, Radisson knows how much of the collective future value of the enterprise is at stake, given the perceived quality of the stay experience. Using this model, Radisson can confidently show that a 10% increase in customer satisfaction among the 10% of highest-quality customers will capture a one-point market share for the brand. Each point in market share for the Radisson brand is worth $20 million in additional revenue. [Barbara Wixom]

**Question**

How can a project team use this information to help determine the economic feasibility of a system?

**CONCEPTS IN ACTION**

**1-D Intangible Value at Carlson Hospitality**

inventory costs. For simplicity, all development costs are assumed to occur in the current year 2015, and all benefits and operational costs are assumed to begin when the system is implemented at the start of 2016, and continue through 2019. Notice that the customer service intangible benefit has been quantified, based on a decrease in customer complaint phone calls. The intangible benefit of being able to offer services that competitors currently offer was not quantified, but it was listed so that the approval committee will consider the benefit when assessing the system's economic feasibility.

**Determine Cash Flow** A formal cost–benefit analysis usually contains costs and benefits over a selected number of years (usually, 3–5 years) to show cash flow over time (Figures 1-8 and 1-12). For example, Figure 1-12 lists the same amount for customer complaint calls, inventory costs, hardware, and software for all 4 years. Often, amounts are augmented by some rate of growth to adjust for inflation or business improvements, as shown by the 6% increase that is added to the sales numbers in the sample spreadsheet. Similarly, labor costs are assumed to increase at a 4% rate each year. Finally, totals are added to determine what the overall benefits and costs.

**Determine ROI** Figure 1-12 includes the ROI calculation for our example project. This project’s ROI is calculated to be 14.1%.

**Determine BEP** Figure 1-12 also includes the BEP calculation for our example project. This project’s BEP is calculated to be 3.37 years.

**Determine NPV** In Figure 1-13, the present value of the costs and benefits has been calculated and added to our example spreadsheet, using a 6% rate of return. The NPV is simply the difference between the total present value of the benefits and the total present value of the costs. As long as the NPV is greater than zero, the project is considered economically viable. In this example, since NPV is $68,292, the project should be accepted from an economic feasibility perspective.

**Organizational Feasibility**

The final feasibility analysis issue is the organizational feasibility of the system: how well the system ultimately will be accepted by its users and incorporated into the ongoing operations of the organization. There are many organizational factors that can have an impact on the
### Benefits

<table>
<thead>
<tr>
<th></th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased sales</td>
<td>500,000</td>
<td>530,000</td>
<td>561,800</td>
<td>595,508</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction in customer complaint calls&lt;sup&gt;a&lt;/sup&gt;</td>
<td>70,000</td>
<td>70,000</td>
<td>70,000</td>
<td>70,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduced inventory costs</td>
<td>68,000</td>
<td>68,000</td>
<td>68,000</td>
<td>68,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Benefits&lt;sup&gt;b&lt;/sup&gt;</strong></td>
<td><strong>638,000</strong></td>
<td><strong>668,000</strong></td>
<td><strong>699,800</strong></td>
<td><strong>733,508</strong></td>
<td></td>
<td><strong>2,364,978</strong></td>
</tr>
<tr>
<td><strong>Present Value Total Benefits</strong></td>
<td><strong>601,887</strong></td>
<td><strong>594,518</strong></td>
<td><strong>587,566</strong></td>
<td><strong>581,007</strong></td>
<td></td>
<td><strong>2,364,978</strong></td>
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</table>

### Development Costs

<table>
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<tr>
<th>Cost Item</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Servers @ $125,000</td>
<td>250,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Printer</td>
<td>100,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Software licenses</td>
<td>34,825</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Server software</td>
<td>10,945</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Development labor</td>
<td>1,236,525</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Development Costs</strong></td>
<td><strong>1,632,295</strong></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td><strong>0</strong></td>
</tr>
</tbody>
</table>

### Operational Costs

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware</td>
<td>50,000</td>
<td>50,000</td>
<td>50,000</td>
<td>50,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Software</td>
<td>20,000</td>
<td>20,000</td>
<td>20,000</td>
<td>20,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operational labor</td>
<td>115,000</td>
<td>119,600</td>
<td>124,384</td>
<td>129,359</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Operational Costs</strong></td>
<td><strong>185,000</strong></td>
<td><strong>189,600</strong></td>
<td><strong>194,384</strong></td>
<td><strong>199,359</strong></td>
<td></td>
<td><strong>394,739</strong></td>
</tr>
<tr>
<td><strong>Total Costs</strong></td>
<td><strong>1,632,295</strong></td>
<td><strong>185,000</strong></td>
<td><strong>189,600</strong></td>
<td><strong>194,384</strong></td>
<td><strong>199,359</strong></td>
<td><strong>2,296,686</strong></td>
</tr>
<tr>
<td><strong>Present Value Total Costs</strong></td>
<td><strong>1,632,295</strong></td>
<td><strong>174,528</strong></td>
<td><strong>168,743</strong></td>
<td><strong>163,209</strong></td>
<td><strong>157,911</strong></td>
<td><strong>2,296,686</strong></td>
</tr>
</tbody>
</table>

NPV (PV Total Benefits – PV Total Costs) = 68,292

<sup>a</sup>Customer service values are based on reduced costs of handling customer complaint phone calls.

<sup>b</sup>An important yet intangible benefit will be the ability to offer services that our competitors currently offer.

---

**FIGURE 1-13** Cost–Benefit Analysis—Discounted Cash Flow Method

...project, and seasoned developers know that organizational feasibility can be the most difficult feasibility dimension to assess. In essence, an organizational feasibility analysis attempts to answer the question “If we build it, will they come?”

One way to assess the organizational feasibility of the project is to understand how well the goals of the project align with business objectives. Strategic alignment is the fit between the project and business strategy—the greater the alignment, the less risky the project will be, from an organizational feasibility perspective. For example, if the marketing department has decided to become more customer focused, then a CRM project that produces integrated customer information would have strong strategic alignment with marketing’s goal. Many projects fail if the IT department alone initiates them and there is little or no alignment with business-unit or organizational strategies.

A second way to assess organizational feasibility is to conduct a stakeholder analysis.<sup>4</sup> A stakeholder is a person, group, or organization that can affect (or can be affected by) a new

Many companies are undergoing server virtualization. This is the concept of putting multiple “virtual” servers onto one physical device. The payoffs can be significant: fewer servers, less electricity, less generated heat, less air conditioning, less infrastructure and administration costs, increased flexibility, less physical presence (that is, smaller server rooms), faster maintenance of servers, and more. There are costs, of course, such as licensing the virtualization software, labor costs in establishing the virtual servers onto a physical device, labor costs in updating tables, and access. But determining the return on investment can be a challenge. Some companies have lost money on server virtualization, while most would say that they have gained a positive return on investment but have not really quantified the results.

Questions

1. How might a company really determine the return on investment for server virtualization?
2. Is this a project that a systems analyst might be involved in? Why or why not?

In general, the most important stakeholders in the introduction of a new system are the project champion, organizational management, and system users (Figure 1-14), but systems sometimes affect other stakeholders as well. For example, a change to a purchasing system will probably affect the firm’s supply chain partners.

The champion is a high-level executive and is usually, but not always, the project sponsor who created the system request. The champion supports the project by providing time and resources (e.g., money) and by giving political support to the project by conveying its importance to other decision makers. More than one champion is preferable because if the champion leaves the organization, the support could leave as well.

While champions provide day-to-day support for the system, organizational management also needs to support the project. Such management support conveys to the rest of the organization the belief that the system will make a valuable contribution and that necessary resources will be made available. Ideally, the management should encourage people in the organization to use the system and to accept the many changes that the system will likely create.

A third important set of stakeholders is the system users who ultimately will use the system once it has been installed in the organization. Too often, the project team meets with users

<table>
<thead>
<tr>
<th>Role</th>
<th>To Enhance Organizational Feasibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Champion</td>
<td>• Make a presentation about the objectives of the project and the proposed benefits to those executives who will benefit directly from the system.</td>
</tr>
<tr>
<td></td>
<td>• Create a prototype of the system to demonstrate its potential value.</td>
</tr>
<tr>
<td>Organizational</td>
<td>• Make a presentation to the management about the objectives of the project and the proposed benefits.</td>
</tr>
<tr>
<td>Management</td>
<td>• Market the benefits of the system, using memos and organizational newsletters.</td>
</tr>
<tr>
<td></td>
<td>• Encourage the champion to talk about the project with his organizational newsletters or her peers.</td>
</tr>
<tr>
<td>System Users</td>
<td>• Assign users official roles on the project team.</td>
</tr>
<tr>
<td></td>
<td>• Assign users specific tasks to perform, with clear deadlines.</td>
</tr>
<tr>
<td></td>
<td>• Ask for feedback from users regularly (e.g., at weekly meetings).</td>
</tr>
</tbody>
</table>

FIGURE 1-14 Important Stakeholders for Organizational Feasibility
at the beginning of a project and then disappears until after the system is created. In this situation, the final product rarely meets the expectations and needs of those who are supposed to use it, because needs change and users become savvier as the project progresses. User participation should be promoted throughout the development process to make sure that the final system will be accepted and used, by getting users actively involved in the development of the system (e.g., performing tasks, providing feedback, and making decisions).

The third column in Figure 1-14 suggests that actions can be taken that influence organizational feasibility. When the organizational feasibility assessment reveals high risks, the team members should employ actions like these to overcome the organizational feasibility concerns.

The final feasibility study helps organizations make wiser investments regarding IS because it forces project teams to consider technical, economic, and organizational factors that can affect their projects. It protects IT professionals from criticism by keeping the business units educated about decisions and positioned as the leaders in the decision-making process. Remember—the feasibility study should be revised throughout the project at points where the project team makes critical decisions about the system (e.g., before the design begins). The final feasibility study can be used to support and explain the critical choices that are made throughout the SDLC.

**Applying the Concepts at Tune Source**

The steering committee met and placed the digital music download project high on its list of projects.

The next step was for Carly and Jason to develop the feasibility analysis. Figure 1-15 presents the executive summary page of the feasibility study: The report itself was about 10 pages long, and it provided additional detail and supporting documentation.

As shown in Figure 1-15, the project is somewhat risky from a technical perspective. Tune Source has minimal experience with the proposed application and the technology. One solution may be to hire a consultant to work with the IT department and to offer guidance.

The economic feasibility analysis includes the assumptions that Carly made in the system request. The summary spreadsheet that led to the values in the feasibility analysis has been included in Appendix 1A. Development costs are expected to be about $280,000. This is a very rough estimate, as Jason has had to make some assumptions about the amount of time it will take to design and program the system. Nonetheless, the digital music download system appears to be very strong economically.

---

**YOUR TURN 1-4 Too Much Paper, Part 2**

Review the description of the South Dakota workers’ compensation project in Your Turn 1-3. There were legal hurdles to implementing a digital solution to handle workers’ compensation claims. One hurdle was that the previous paper method had physical signatures from employees signing off that they had received treatment or that the doctor had signed off on medical treatment performed. How could such permissions be preserved and duplicated digitally?

In addition, some clerks were afraid that the digital solution might not work. What if they could not find an electronic file on the computer? What if a hard drive crashed or the files were accidentally deleted? What if they could not retrieve the electronic file?

**Questions**

1. What legal issues might arise from having only “digital signatures” or only electronic/paper copies of documents instead of physical documents? How do these issues affect the project’s feasibility?

2. In terms of organizational feasibility and adoption, what might an analyst do to convince these clerks to adopt and use the new technology?
Digital Music Download Project Executive Summary

Carly Edwards and Jason Wells created the following feasibility analysis for the Tune Source Digital Music Download Project. The System Request is attached, along with the detailed feasibility study. The highlights of the feasibility analysis are as follows:

Technical Feasibility
The Digital Music Download system is feasible technically, although there is some risk.

Tune Source’s risk regarding familiarity with music download applications is moderately high.

- The Marketing Department has little experience with a subscription-based business model.
- The IT department has strong knowledge of the company’s existing Web-based CD sales system, but it has not worked with music downloads or customer subscription programs.
- Numerous music download sites exist on the Internet; many employees have experience as users of these systems.

Tune Source’s risk regarding familiarity with the technology is moderately low.

- The IT department has knowledge of the current Web-based order entry system and the databases and Internet technology it uses.
- The IT department has no direct knowledge of the technology required to store and deliver digital music downloads; however, many of the technical issues will be the responsibility of the ISP.
- Consultants are readily available to provide help in this area.

The project size is considered medium risk.

- The project team will likely consist of 10 or fewer people.
- Business user involvement will be required.
- The project time frame is somewhat critical, since the system is needed to retain our competitive position in the market.

The compatibility with Tune Source’s existing technical infrastructure should be good.

- An Internet infrastructure is already in place at the retail stores and corporate headquarters.
- The ISP should be able to scale its services to accommodate the new Digital Music Download system.

Economic Feasibility
A cost–benefit analysis was performed; see attached spreadsheet for details (provided in Appendix 1A). Conservative estimates show that the Digital Music Download system has a good chance of significantly enhancing the company’s bottom line.

ROI over 3 years: 280%
NPV over 3 years: $4,180,431
Break-even occurs after 0.17 years

Intangible Costs and Benefits
- Improved customer satisfaction.
- Enhanced competitive position through expansion of our brand into the music download market.

Organizational Feasibility
From an organizational perspective, this project has low risk. The top executives of the company have a strong interest in the project, and the project champion, Carly Edwards, is a respected and knowledgeable marketing executive.

The users of the system, Internet consumers and in-store kiosk users, are expected to appreciate the entry of Tune Source into the music download arena. Management at the stores may have some concern about lost CD sales; however, since customers have so many other options available for music downloads, this system may prevent our losing those customers to other digital music sources and may provide us with the opportunity to cross-sell those customers from our CD inventory.

Additional Comments
- The marketing department views this as a strategic system. This system will allow us to leverage our music archive and our well-established market position to establish a presence in the digital music download business. Our customers have been requesting such a capability, and we believe it will be well accepted.
- We should consider hiring a consultant with expertise in similar applications to assist with the project.
- We will need new staff to operate the system and potentially to provide customer service for subscribers and gift-card holders.

FIGURE 1-15  Feasibility Analysis Executive Summary for Tune Source

The organizational feasibility is presented in Figure 1-15. There is a strong champion, well placed in the organization, to support the project. The project originated in the business or functional side of the company, not the IS department, and support for the project among the senior management team is strong.
Additional stakeholders in the project are the management team responsible for the operations of the traditional stores and the store managers. They should be quite supportive, given the added service that they now can offer. Carly and Jason need to make sure that they are included in the development of the system so that they can appropriately incorporate it into their business processes.

CHAPTER REVIEW

After reading and studying this chapter, you should be able to:

- Explain the role of the systems analyst in the process of developing information systems.
- Discuss the skills needed to be a successful systems analyst.
- List and explain the four primary phases of the systems development life cycle (SDLC).
- Explain the ways that projects are identified and initiated.
- Explain why it is important to ensure that a proposed information system will add value to the organization.
- Describe the purpose of the systems request and explain the contents of its four main sections.
- Be able to create a systems request for a proposed project.
- Discuss the purpose of the feasibility study.
- Describe the issues that are considered when evaluating a project’s technical feasibility.
- Be able to develop an economic feasibility assessment for a project.
- Understand and evaluate the organizational feasibility of a project.

KEY TERMS

- Analysis models
- Analysis phase
- Analysis strategy
- Approval committee
- Architecture design
- As-is system
- Break-even analysis
- Business analyst
- Business need
- Business process automation (BPA)
- Business process
- Business requirements
- Business value
- Change management analyst
- Change management (BMP)
- Change management (BPR)
- Champion
- Cost–benefit analysis
- Database and file specifications
- Deliverable
- Design phase
- Design strategy
- Development costs
- Economic feasibility
- Emerging technology
- Familiarity with technology
- Familiarity with the application
- Feasibility analysis
- Feasibility study
- First mover
- Functionality
- Gradual refinement
- Implementation phase
- Infrastructure analyst
- Installation
- Intangible benefits
- Intangible costs
Intangible value
Interface design
Net present value (NPV)
Operation costs
Organizational feasibility
Organizational management
Payback method
Phase
Planning phase
Program design

Project initiation
Project management
Project manager
Project plan
Project size
Project sponsor
Requirements analyst
Software architect
Special issues
Stakeholder
Stakeholder analysis

Steering committee
Step
Strategic alignment
Support plan
System proposal
System request
System specification
System users
Systems analyst
Systems development life cycle (SDLC)

Tangible benefits
Tangible value
Technical feasibility
Technique
To-be system
Training plan
Total cost of ownership (TCO)
Workplan

QUESTIONS

1. List and describe the six general skills all project team members should have.
2. What are the major roles on a project team?
3. Compare and contrast the role of a systems analyst, business analyst, and infrastructure analyst.
4. Compare and contrast the role of requirements analyst, change management analyst, and project manager.
5. Describe the major phases in the systems development life cycle (SDLC).
6. Describe the principal steps in the planning phase. What are the major deliverables?
7. Describe the principal steps in the analysis phase. What are the major deliverables?
8. Describe the principal steps in the design phase. What are the major deliverables?
9. Describe the principal steps in the implementation phase. What are the major deliverables?
10. Which phase in the SDLC is the most important?
11. What does gradual refinement mean in the context of SDLC?
12. Describe the four steps of business process management (BPM). Why do companies adopt BPM as a management strategy?
13. Compare and contrast BPA, BPI, and BPR. Which is most risky? Which has the greatest potential value?
14. Give three examples of business needs for a system.
15. Describe the roles of the project sponsor and the approval committee.
16. What is the purpose of an approval committee? Who is usually on this committee?

17. Why should the system request be created by a businessperson as opposed to an IS professional?
18. What is the difference between intangible value and tangible value? Give three examples of each.
19. What are the purposes of the system request and the feasibility analysis? How are they used in the project selection process?
20. Describe two special issues that may be important to list on a system request.
21. Describe the three dimensions of feasibility analysis.
22. What factors are used to determine project size?
23. Describe a “risky” project in terms of technical feasibility. Describe a project that would not be considered risky.
24. What are the steps for assessing economic feasibility? Describe each step.
25. List two intangible benefits. Describe how these benefits can be quantified.
26. List two tangible benefits and two operational costs for a system. How would you determine the values that should be assigned to each item?
27. Explain how an expected value can be calculated for a cost or benefit. When would this be done?
28. Explain the net present value and return on investment for a cost–benefit analysis. Why would these calculations be used?
29. What is the break-even point for the project? How is it calculated?
30. What is stakeholder analysis? Discuss three stakeholders that would be relevant for most projects.

EXERCISES

A. Go to www.bls.gov and perform a search for “systems analyst.” What is the employment outlook for this career? Compare and contrast the skills listed with the skills that were presented in this chapter.

B. Think about your ideal analyst position. Write a job posting to hire someone for that position. What requirements would the job have? What skills and experience would be required? How would applicants demonstrate that they have the appropriate skills and experience?

C. Locate a news article in an IT trade web site (e.g., Computer world.com, InformationWeek.com) about an organization that is implementing a new computer system. Describe the tangible and intangible values that the organization seeks from the new system.
D. Car dealers have realized how profitable it can be to sell automobiles by using the Web. Pretend that you work for a local car dealership that is part of a large chain such as CarMax. Create a system request that you might use to develop a Web-based sales system. Remember to list special issues that are relevant to the project.

E. Think about your own university or college and choose an idea that could improve student satisfaction with the course enrollment process. Currently, can students enroll for classes from anywhere? How long does it take? Are directions simple to follow? Is online help available? Next, think about how technology can help support your idea. Would you need completely new technology? Can the current system be changed?

Create a system request that you could give to the administration that explains the sponsor, business need, business requirements, and potential value of the project. Include any constraints or issues that should be considered.

F. Think about the idea that you developed in Exercise E to improve your university or college course enrollment process. List three things that influence the technical feasibility of the system, the economic feasibility of the system, and the organizational feasibility of the system. How can you learn more about the issues that affect the three kinds of feasibility?

G. Amazon.com was very successful when it decided to extend its offerings beyond books to many other products. Amazon.com was unable to compete successfully with eBay.com’s auction site, however, and eventually abandoned its own auction site. What feasibility factors probably had the most significance in this failure? Explain.

H. Interview someone who works in a large organization, and ask him or her to describe the approval process that exists for proposed new development projects. What do they think about the process? What are the problems? What are the benefits?

I. Reread the “Your Turn 1-2” box (Implementing a Satellite Data Network). Create a list of the stakeholders that should be considered in a stakeholder analysis of this project.

MINICASES

1. Barbara Singleton, manager of western regional sales at the WAMAP Company, requested that the IS department develop a sales force management and tracking system that would enable her to better monitor the performance of her sales staff. Unfortunately, due to the massive backlog of work facing the IS department, her request was given a low priority. After 6 months of inaction by the IS department, Barbara decided to take matters into her own hands. Following the advice of friends, Barbara purchased a PC and simple database software and constructed a sales force management and tracking system on her own.

Although Barbara’s system has been “completed” for about 6 weeks, it still has many features that do not work correctly, and some functions are full of errors. Barbara’s assistant is so mistrustful of the system that she has secretly gone back to using her old paper-based system, since it is much more reliable.

Over dinner one evening, Barbara complained to a systems analyst friend, “I don’t know what went wrong with this project. It seemed pretty simple to me. Those IS guys wanted me to follow this elaborate set of steps and tasks, but I didn’t think I could build this system and tweak it around until I got what I wanted without all the fuss and bother of the methodology the IS guys were pushing. I mean, doesn’t that just apply to their big, expensive systems?”

Assuming that you are Barbara’s systems analyst friend, how would you respond to her complaint?

2. The Amberssen Specialty Company is a chain of 12 retail stores that sell a variety of imported gift items, gourmet chocolates, cheeses, and wines in the Toronto area. Amberssen has an IS staff of three people who have created a simple, but effective, information system of networked point-of-sale registers at the stores, and a centralized accounting system at the company headquarters. Harry Hilman, the head of Amberssen’s IS group, has just received the following memo from Bill Amberssen, Sales Director (and son of Amberssen’s founder):

Harry—It’s time Amberssen Specialty launched itself on the Internet. Many of our competitors are already there, selling to customers without the expense of a retail storefront, and we should be there too. I project that we could double or triple our annual revenues by selling our products on the Internet. I’d like to have this ready by Thanksgiving, in time for the prime holiday gift-shopping season. Bill

After pondering this memo for several days, Harry scheduled a meeting with Bill so that he could clarify Bill’s vision of this venture. Using the standard content of a system request as your guide, prepare a list of questions that Harry needs to have answered about this project.

3. The Decker Company maintains a fleet of 10 service trucks and crew which provides a variety of plumbing, heating, and cooling repair services to residential customers. Currently, it takes on average about 6 hours before a service team responds to a service request. Each truck and crew averages 12 service calls per week, and the average revenue earned per service call is $150. Each truck is in service 50 weeks per year. Due to the difficulty in scheduling and routing, there is considerable slack time for each truck and crew during a typical week.

In an effort to more efficiently schedule the trucks and crew and improve their productivity, Decker management is evaluating the purchase of a prewritten routing and scheduling software package. The benefits of the system will include reduced response time to service requests and more productive service teams, but management is having trouble quantifying these benefits.

One approach is to make an estimate of how much service response time will decrease with the new system, which
then can be used to project the increase in the number of service calls made each week. For example, if the system permits the average service response time to fall to 4 hours, the management believes that each truck will be able to make 16 service calls per week on average—an increase of 4 calls per week. With each truck making 4 additional calls per week and the average revenue per call at $150, the revenue increase per truck per week is $600 (4 × $150). With 10 trucks in service 50 weeks per year, the average annual revenue increase will be $300,000 ($600 × 10 × 50).

The Decker Company management is unsure whether the new system will enable response time to fall to 4 hours on average, or will be some other number. Therefore, management has developed the following range of outcomes that may be possible outcomes of the new system, along with probability estimates of each outcome occurring:

<table>
<thead>
<tr>
<th>New Response Time</th>
<th># Calls/Truck/Week</th>
<th>Likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 hours</td>
<td>20</td>
<td>20%</td>
</tr>
<tr>
<td>3 hours</td>
<td>18</td>
<td>30%</td>
</tr>
<tr>
<td>4 hours</td>
<td>16</td>
<td>50%</td>
</tr>
</tbody>
</table>

Given these figures, prepare a spreadsheet model that computes the expected value of the annual revenues to be produced by this new system.

4. Martin is working to develop a preliminary cost–benefit analysis for a new client-server system. He has identified a number of cost factors and values for the new system, summarized in the following tables:

**Development Costs—Personnel**

<table>
<thead>
<tr>
<th>Position</th>
<th>Hours/Year per Employee</th>
<th>Rate/hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Systems Analysts</td>
<td>400</td>
<td>$50/hour</td>
</tr>
<tr>
<td>4 Programmer Analysts</td>
<td>250</td>
<td>$35/hour</td>
</tr>
<tr>
<td>1 GUI Designer</td>
<td>200</td>
<td>$40/hour</td>
</tr>
<tr>
<td>1 Telecommunications Specialist</td>
<td>50</td>
<td>$50/hour</td>
</tr>
</tbody>
</table>

**Development Costs—Training**

- Oracle training registration: $3500/student

**Development Costs—New Hardware and Software**

- Development server: $18,700
- Server software (OS, misc.): $1500
- DBMS server software: $7500
- DBMS client software: $950/client

**Annual Operating Costs—Personnel**

- 2 Programmer Analysts: 125 hours/ea @ $35/hour
- 1 System Librarian: 20 hours/ea @ $15/hour

**Annual Operating Costs—Hardware, Software, and Misc.**

- Maintenance agreement for server: $995
- Maintenance agreement for server: $525
- DBMS software: $1500
- Preprinted forms: 15,000/year @ $.22/form

The benefits of the new system are expected to come from two sources: increased sales and lower inventory levels. Sales are expected to increase by $30,000 in the first year of the system’s operation and will grow at a rate of 10% each year thereafter. Savings from lower inventory levels are expected to be $15,000 per year for each year of the project’s life.

Using a format similar to the spreadsheets in this chapter, develop a spreadsheet that summarizes this project’s cash flow, assuming a 4-year useful life after the project is developed. Compute the present value of the cash flows, using an interest rate of 9%.

What is the NPV for this project? What is the ROI for this project? What is the break-even point? Should this project be accepted by the approval committee?

Figure 1A-1 contains the summary spreadsheet for the Tune Source digital music download project. As shown, Carly’s original sales projections are used for the first year’s revenues. Sales are expected to grow 4% in the second year and 3% in the third year.

Cost projections are based on Jason’s assumptions about the time it will take to develop the system and the resources that will be required. Operating costs have a considerable new labor component because a new business unit is being created, requiring additional staff.*

Figure 1A-1 incorporates several of the financial analysis techniques we have discussed. The rows marked A and C summarize the annual benefits and costs, respectively. The row marked D shows the yearly net benefits (total benefits – total costs). The ROI calculation shows that this project is expected to return 280% on the investment, calculated by dividing the total benefits in row A by the total costs in row C.

Row E shows the cumulative cash flow for the project, and this is used to determine the break-even point. As seen in Figure 1A–1, the project fully recovers its costs in the first year, since the cumulative net cash flow is positive in the first year.

The row marked B computes the present value of each year’s total benefits, and the row marked F computes the present value of each year’s total costs. These values are used in the NPV calculation. The total present value of costs is subtracted from the total present value of benefits, and the result is a large positive number, indicating the high desirability of this investment.

This spreadsheet shows that this project can add significant business value even if the underlying assumptions prove to be overly optimistic.

*Some of the salary information may seem high to you. But keep in mind that most companies use a “full cost” model for estimating salary cost in which all benefits (e.g., health insurance, retirement, payroll taxes) are included in salaries when estimating costs.
### Chapter 1 The Systems Analyst and Information Systems Development

<table>
<thead>
<tr>
<th>Benefits</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased sales from individual music downloads</td>
<td>757,500</td>
<td>787,800</td>
<td>811,434</td>
<td>2,356,734</td>
<td></td>
</tr>
<tr>
<td>Increased sales from customer subscriptions</td>
<td>950,000</td>
<td>988,000</td>
<td>1,017,640</td>
<td>2,955,640</td>
<td></td>
</tr>
<tr>
<td>Increased sales from in-store or web site CD sales</td>
<td>205,000</td>
<td>213,200</td>
<td>219,596</td>
<td>637,796</td>
<td></td>
</tr>
<tr>
<td>Increased sales from music download gift cards</td>
<td>153,000</td>
<td>159,120</td>
<td>163,894</td>
<td>476,014</td>
<td></td>
</tr>
<tr>
<td><strong>Total Benefits</strong></td>
<td><strong>2,065,500</strong></td>
<td><strong>2,148,120</strong></td>
<td><strong>2,212,564</strong></td>
<td><strong>6,426,184</strong></td>
<td></td>
</tr>
</tbody>
</table>

| Present Value Total Benefits | 1,948,585 | 1,911,819 | 1,857,711 | 5,718,115 |

<table>
<thead>
<tr>
<th>Development Costs</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor: Analysis and design</td>
<td>42,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Labor: Implementation</td>
<td>120,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Consultant fees</td>
<td>50,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Development training</td>
<td>5,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Office space and equipment</td>
<td>2,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>In-store kiosks</td>
<td>25,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Software</td>
<td>10,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Hardware</td>
<td>25,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Development Costs</strong></td>
<td><strong>279,000</strong></td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operational Costs</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor: Webmaster</td>
<td>85,000</td>
<td>87,550</td>
<td>90,177</td>
<td>262,727</td>
</tr>
<tr>
<td>Labor: Network technician</td>
<td>60,000</td>
<td>61,800</td>
<td>63,654</td>
<td>185,454</td>
</tr>
<tr>
<td>Labor: Computer operations</td>
<td>50,000</td>
<td>51,500</td>
<td>53,045</td>
<td>154,545</td>
</tr>
<tr>
<td>Labor: Business manager</td>
<td>60,000</td>
<td>61,800</td>
<td>63,654</td>
<td>185,454</td>
</tr>
<tr>
<td>Labor: Assistant manager</td>
<td>45,000</td>
<td>46,350</td>
<td>47,741</td>
<td>139,091</td>
</tr>
<tr>
<td>Labor: Three staff</td>
<td>90,000</td>
<td>92,700</td>
<td>95,481</td>
<td>278,181</td>
</tr>
<tr>
<td>Software upgrades</td>
<td>1,000</td>
<td>1,000</td>
<td>1,000</td>
<td>3,000</td>
</tr>
<tr>
<td>Software licenses</td>
<td>3,000</td>
<td>1,000</td>
<td>1,000</td>
<td>5,000</td>
</tr>
<tr>
<td>Hardware upgrades</td>
<td>5,000</td>
<td>3,000</td>
<td>3,000</td>
<td>11,000</td>
</tr>
<tr>
<td>User training</td>
<td>2,000</td>
<td>1,000</td>
<td>1,000</td>
<td>4,000</td>
</tr>
<tr>
<td>Additional ISP charges</td>
<td>15,000</td>
<td>17,000</td>
<td>18,500</td>
<td>50,500</td>
</tr>
<tr>
<td>Communications charges</td>
<td>20,000</td>
<td>20,000</td>
<td>20,000</td>
<td>60,000</td>
</tr>
<tr>
<td>Marketing expenses</td>
<td>25,000</td>
<td>25,000</td>
<td>25,000</td>
<td>75,000</td>
</tr>
<tr>
<td><strong>Total Operational Costs</strong></td>
<td><strong>461,000</strong></td>
<td><strong>469,700</strong></td>
<td><strong>483,251</strong></td>
<td><strong>1,413,951</strong></td>
</tr>
</tbody>
</table>

| Total Costs | 279,000 | 461,000 | 469,700 | 483,251 | 1,692,951 |
| Total Benefits – Total Costs | (279,000) | 1,604,500 | 1,678,420 | 1,729,313 | 4,733,233 |
| Cumulative Net Cash Flow | (279,000) | 1,325,500 | 3,003,920 | 4,733,233 |
| Present Value Total Costs | 279,000 | 434,906 | 418,031 | 405,747 | 1,537,684 |
| Return on Investment (ROI) | 280% | (6,426,184/1,692,951) |
| Break-Even Point | 0.17 years | (Costs are fully recovered in the first year; [1,604,500 – 1,325,500]/1,604,500) |
| NPV (PV Total Benefits – PV Total Costs) | 4,180,431 | (5,718,115 – 1,537,684) |

**Intangible Benefits:**
- Improved customer satisfaction
- Enhanced market position

**FIGURE 1A-1 Economic Feasibility Analysis for Tune Source**